

**IN THE CLAIMS:**

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

1. (currently amended) A pattern recognition apparatus for recognizing a pattern based on a value of a probability density function defined for each category in a feature vector space of a pattern, comprising:

a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern ~~when a set of difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and~~

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and

wherein said calculation device:

calculating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value.

2. (original) The pattern recognition apparatus according to claim 1, further comprising

a storage device storing both information about eigenvalues and eigenvectors of a covariance matrix of a fluctuating distribution of the category and information about eigenvalues

and eigenvectors of a covariance matrix of the normal distribution,

wherein said calculation device calculates the value of the discriminant function using the information stored in the storage device.

3. (currently amended) A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern of a specific font ~~when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set of the specific font and an average feature vector of each correct category;~~ an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and

wherein said calculation device:

calculating a set of difference vectors by calculating a difference between a feature vector of each character pattern in a character pattern set of the specific font and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value.

4. (currently amended) A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern inputted by specific input equipment ~~when a set of difference vectors is generated by calculating a difference between a feature vector of each~~

~~character pattern in a character pattern set, which is inputted by the specific input equipment, and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and~~

~~a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and~~

~~wherein said calculation device:~~

~~calculating a set of difference vectors by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted by the specific input equipment, and an average feature vector of each correct category;~~

~~calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and~~

~~calculating the value of the discriminant function for the specific category based on the expected value.~~

5. (currently amended) A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

~~a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern inputted with specific resolution when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted with the specific resolution, and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and~~

~~a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and~~

~~wherein said calculation device:~~

~~calculating a set of difference vectors by calculating a difference between a feature~~

vector of each character pattern in a character pattern set, which is inputted with the specific resolution, and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value.

6. (currently amended) A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

a calculation device calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set  $D_{SF}$  of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set of a specific font  $F$  and an average feature vector of each correct category; a set  $D_{SI}$  of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted by specific input equipment  $I$ , and an average feature vector of each correct category, a set  $D_{SR}$  of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a character pattern set, which is inputted with specific resolution  $R$ , and an average feature vector of each correct category, an expected value  $f_1$  of a probability density function  $f_0$  of the specific category is defined at each point in the feature vector space using a normal distribution function with a autocorrelation matrix of the set  $D_{SF}$  as a covariance matrix, as a probability density function, an expected value  $f_2$  of the expected value  $f_1$  is defined at each point using a normal distribution with a autocorrelation matrix of the set  $D_{SI}$  as a covariance matrix, as a probability density function, an expected value  $f_3$  of the expected value  $f_2$  is defined at each point using a normal distribution with ana autocorrelation matrix of the set  $D_{SR}$  as a covariance matrix, as a probability density function, and the discriminant function is defined based on the expected value  $f_3$ ; and

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result.

7. (currently amended) A pattern recognition apparatus for recognizing a character based on a value of a probability density function defined for each category in a feature vector space of a character pattern, comprising:

~~a calculation device calculating a value of a discriminant function of a specific category for a feature vector of a target character pattern included in an input document when a set of difference vectors is generated by calculating a difference between a feature vector of each character pattern in a set of character patterns, which are included in the input document and for which the maximum value of a probability density function of a category is larger than a threshold value, and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the target character pattern as a covariance matrix and an average, respectively, as a probability density function, and the discriminant function is defined based on the expected value; and~~

a recognition device recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and

wherein said calculation device:

calculating a set of difference vectors by calculating a difference between a feature vector of each character pattern in a character pattern set, which are included in the input document and for which a maximum value of a probability density function of a category is larger than a threshold value, and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value.

8. (currently amended) A computer-readable storage medium which records a program for enabling a computer to recognize a pattern based on a value of a probability density function that is defined for each category in a feature vector space of a pattern, the program enabling the computer to perform:

~~calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set of difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined~~

~~based on the expected value;~~

~~calculating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;~~

~~calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and~~

~~calculating the value of the discriminant function for the specific category based on the expected value;~~

~~recognizing the unknown pattern based on the value of the discriminant function; and outputting a recognition result.~~

9. (currently amended) A propagation signal which propagates a program for enabling a computer to recognize a pattern based on a value of a probability density function that is defined for each category in a feature vector space of a pattern, the program enabling the computer to perform:

~~calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern when a set of difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value;~~

~~calculating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;~~

~~calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and~~

~~calculating the value of the discriminant function for the specific category based on the expected value;~~

~~recognizing the unknown pattern based on the value of the discriminant function; and outputting a recognition result.~~

10. A pattern recognition method for recognizing a pattern based on a value of a probability density function defined for each category in a feature vector space of a pattern, comprising:

~~generating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;~~

~~obtaining an expected value of a probability density function of a specific category using a normal distribution with an autocorrelation matrix of the set of difference vectors and a feature vector of an unknown pattern as a covariance matrix and an average, respectively, as a probability density function;~~

~~obtaining a discriminant function of the specific category based on the expected value;~~

~~calculating a value of the discriminant function for the feature vector of the unknown pattern; and~~

calculating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value;

recognizing the unknown pattern based on the value of the discriminant function; and  
outputting a recognition result.

11. (currently amended) A pattern recognition apparatus for recognizing a pattern based on a value of a probability density function defined for each category in a feature vector space of a pattern, comprising:

calculation means for calculating a value of a discriminant function of a specific category for a feature vector of an unknown pattern ~~when a set of difference vectors is generated by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category, an expected value of a probability density function of the specific category is defined using a normal distribution with an autocorrelation matrix of the set of difference vectors and the feature vector of the unknown pattern as a~~

~~covariance matrix and an average, respectively, as a probability density function and the discriminant function is defined based on the expected value; and~~

recognition means for recognizing the unknown pattern based on the value of the discriminant function and outputting a recognition result; and

wherein said calculation means:

calculating a set of difference vectors by calculating a difference between a feature vector of each pattern in a specific pattern set and an average feature vector of each correct category;

calculating an expected value of a probability density function of a specific category using an error distribution corresponding to the set of difference vectors as the probability density function; and

calculating the value of the discriminant function for the specific category based on the expected value.